CLAIMS

1. A power supply system comprising:

a power supply;

a load coupled to the power supply via a power supply line to receive a voltage therefrom;

a circuit protection device comprising:

at least one switch device coupled between the power supply and the load on the power supply line;

a first controller coupled to the at least one switch for:

A. monitoring current flow through the at least one switch;

B. maintaining the at least one switch in an ON state while current flows through the at least one switch in a first direction; and

C. causing the at least one switch to toggle to an OFF state if current flowing through the at least one switch flows in a second direction; and

a second controller coupled to the power supply line between the power supply and the at least one switch and coupled to the at least one switch for sensing an amount of current flowing between the power supply and the at least one switch and causing the at least one switch to toggle to the OFF state when the current sensed by the second controller exceeds a reference value.

2. The power supply system of claim 1 wherein the at least one switch comprises a pair of MOSFETs.

3. The power supply system of claim 2 wherein the first controller comprises a first input coupled to the power supply line between the pair of MOSFETs and the power supply, a second input coupled to the power supply line between the pair of MOSFETs and the load, and an output coupled to gate terminals of the pair of MOSFETs, wherein,

when the output is in a first state, the pair of MOSFETs is in the ON state and when the output is in a second state, the pair of MOSFETs is in the OFF state.

4. The power supply system of claim 3 wherein the second controller comprises a current sensing device coupled to the power supply line between the power supply and the pair of MOSFETs for sensing the current in the power supply line and outputting a sensed voltage corresponding to the sensed current, a comparing device for comparing the sensed voltage to a reference voltage and outputting a first output when the sensed voltage exceeds the reference voltage and a switch coupled between the comparing device and the gate terminals of the pair of MOSFETs, wherein the switch, upon receiving the first output of the comparing device, operates to toggle the pair of MOSFETs to the OFF state.

5. The power supply system of claim 4 wherein the first controller comprises a timer device and, upon receiving the first output from the comparing device, the second controller switch operates to disable the timer device, thus driving the output of the first controller from the first state to the second state, causing the pair of MOSFETs to toggle to the OFF state.

6. The power supply system of claim 4 wherein the first controller comprises an undervoltage protection device and, upon receiving the first output from the comparing device, the second controller switch operates to enable the undervoltage protection device, thus driving the output of the first controller from the first state to the second state, causing the pair of MOSFETs to toggle to the OFF state.

7. The power supply system of claim 4 wherein, upon receiving the first output from the comparing device, the

second controller switch operates to pull the control terminals from the first state to the second state, causing the pair of MOSFETs to toggle to the OFF state.

8. The power supply system of claim 1 wherein the first controller comprises a first input coupled to the power supply line between the at least one switch and the power supply, a second input coupled to the power supply line between the at least one switch and the load, and an output coupled to a control terminal of the at least one switch, wherein, when the output is in a first state, the at least one switch is in the ON state and when the output is in a second state, the at least one switch is in the OFF state.

9. The power supply system of claim 8 wherein the second controller comprises a current sensing device coupled to the power supply line between the power supply and the at least one switch for sensing the current in the power supply line and outputting a sensed voltage corresponding to the sensed current, a comparing device for comparing the sensed voltage to a reference voltage and outputting a first output when the sensed voltage exceeds the reference voltage and a switch coupled between the comparing device and the gate terminals of the at least one switch, wherein the switch, upon receiving the first output of the comparing device, operates to toggle the at least one switch to the OFF state.

10. The power supply system of claim 9 wherein the first controller comprises a timer device and, upon receiving the first output from the comparing device, the second controller switch operates to disable the timer device, thus driving the output of the first controller from the first state to the second state, causing the at least one switch to toggle to the OFF state.

11. The power supply system of claim 9 wherein the first controller comprises an undervoltage protection device and, upon receiving the first output from the comparing device, the second controller switch operates to enable the undervoltage protection device, thus driving the output of the first controller from the first state to the second state, causing the at least one switch to toggle to the OFF state.

12. The power supply system of claim 9 wherein, upon receiving the first output from the comparing device, the second controller switch operates to pull the control terminals from the first state to the second state, causing the at least one switch to toggle to the OFF state.

13. A power supply system comprising:

a power supply;

a load coupled to the power supply via a power supply line to receive a voltage therefrom;

at least one switch device coupled between the power supply and the load on the power supply line;

a first controller coupled to the at least one switch for causing the at least one switch to toggle to an OFF state if current flowing through the at least one switch flows in a direction opposite a normal operating current direction; and

a second controller coupled to the power supply line between the power supply and the at least one switch and coupled to the at least one switch for sensing an amount of current flowing between the power supply and the at least one switch and causing the at least one switch to toggle to the OFF state when the current sensed by the second controller exceeds a reference value.

14. The power supply system of claim 13 wherein the at least one switch comprises a pair of MOSFETs.

15. The power supply system of claim 14 wherein the first controller comprises a first input coupled to the power supply line between the pair of MOSFETs and the power supply, a second input coupled to the power supply line between the pair of MOSFETs and the load, and an output coupled to gate terminals of the pair of MOSFETs, wherein, when the output is in a first state, the pair of MOSFETs is in the ON state and when the output is in a second state, the pair of MOSFETs is in the OFF state.

16. The power supply system of claim 15 wherein the second controller comprises a current sensing device coupled to the power supply line between the power supply and the pair of MOSFETs for sensing the current in the power supply line and outputting a sensed voltage corresponding to the sensed current, a comparing device for comparing the sensed voltage to a reference voltage and outputting a first output when the sensed voltage exceeds the reference voltage and a switch coupled between the comparing device and the gate terminals of the pair of MOSFETs, wherein the switch, upon receiving the first output of the comparing device, operates to toggle the pair of MOSFETs to the OFF state.

17. The power supply system of claim 16 wherein the first controller comprises a timer device and, upon receiving the first output from the comparing device, the second controller switch operates to disable the timer device, thus driving the output of the first controller from the first state to the second state, causing the pair of MOSFETs to toggle to the OFF state.

18. The power supply system of claim 16 wherein the first controller comprises an undervoltage protection device and, upon receiving the first output from the comparing device, the second controller switch operates to enable the

undervoltage protection device, thus driving the output of the first controller from the first state to the second state, causing the pair of MOSFETs to toggle to the OFF state.

19. The power supply system of claim 16 wherein, upon receiving the first output from the comparing device, the second controller switch operates to pull the control terminals from the first state to the second state, causing the pair of MOSFETs to toggle to the OFF state.

20. The power supply system of claim 13 wherein the first controller comprises a first input coupled to the power supply line between the at least one switch and the power supply, a second input coupled to the power supply line between the at least one switch and the load, and an output coupled to a control terminal of the at least one switch, wherein, when the output is in a first state, the at least one switch is in the ON state and when the output is in a second state, the at least one switch is in the OFF state.

21. The power supply system of claim 20 wherein the second controller comprises a current sensing device coupled to the power supply line between the power supply and the at least one switch for sensing the current in the power supply line and outputting a sensed voltage corresponding to the sensed current, a comparing device for comparing the sensed voltage to a reference voltage and outputting a first output when the sensed voltage exceeds the reference voltage and a switch coupled between the comparing device and the gate terminals of the at least one switch, wherein the switch, upon receiving the first output of the comparing device, operates to toggle the at least one switch to the OFF state.

22. A method of providing fault protection in a power supply system, the method comprising:

A. monitoring a current flowing from a power supply to a load via a power supply line;

B. toggling a switch device coupled between the power supply and the load in the power supply line from an ON state to an OFF state when the current begins to flow from the load to the power supply;

C. monitoring the amplitude of the current flowing in the power supply line; and

D. toggling the switch device from the ON state to the OFF state when the amplitude of the current in the power supply line exceeds a reference value.

23. A fault protection system, comprising:

means for monitoring a current flowing from a power supply to a load via a power supply line;

means for toggling a switch device coupled between the power supply and the load in the power supply line from an ON state to an OFF state when the current begins to flow from the load to the power supply;

means for monitoring the amplitude of the current flowing in the power supply line; and

means for toggling the switch device from the ON state to the OFF state when the amplitude of the current in the power supply line exceeds a reference value.